CITY OF WESTON (PWS 6210019)
SOURCE WATER ASSESSMENT FINAL REPORT

February 21, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment areas and sensitivity factors associated with the wells, the springs, and the aquifer characteristics.

This report, *Source Water Assessment for the City of Weston, Idaho*, describes the public water system (PWS), the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The City of Weston PWS (# 6210019) is a community drinking water system located in Franklin County. The water system includes two wells and two springs. Both wells are located in a field of hay and weeds near Weston Creek in Weston Canyon approximately four miles west of the City of Weston. Well #1 is a backup well, constructed in 1988 and produces approximately 90 gallons per minute (gpm) of water. Well #2 is the main well for the system and is located approximately 110 yards west of Well #1. It was also constructed in 1988 and produces 200 gpm of water. The springs of the system are approximately 175 feet apart and are located next to Weston Creek. Spring #1 produces 100 gpm and Spring #2 produces 125 gpm. The water from the wells and the springs are stored in two buried, concrete reservoirs located about two miles west of Weston. This water is treated manually by adding 2 gallons (12%) of sodium hypochlorite to the reservoirs once a month. The water system for the City of Weston serves approximately 390 persons through 134 connections.

The potential contaminant sources within the delineation capture zones of the wells and the springs include the field in which the wells are located, a dairy, Weston Creek, Weston Canyon Road (Highway 36), an unimproved road, and livestock near the wells. If an accidental spill occurred on the highway or on the unimproved road or into the creek, inorganic chemical (IOC) contaminants, volatile organic chemical (VOC) contaminants, synthetic organic chemical (SOC) contaminants, or microbial contaminants could be added to the aquifer systems. Depending on the chemicals used in and on the hay grown in the field, IOCs, VOCs, SOCs, and microbial contaminants could leach down into the aquifer systems, contaminating the drinking water of the wells. Livestock and the dairy can add IOCs and microbial contaminants to the aquifer. These potential contaminant sources identified within the delineated areas of the Weston wells and springs may contribute to the overall vulnerability of the water sources.

Final spring susceptibility scores are derived from heavily weighted potential contaminant inventory/land use scores and adding them with system construction scores. Final well susceptibility scores are derived similarly from equally weighted potential contaminant inventory/land use scores and adding them with the hydrologic sensitivity of the well area as well as with the system construction scores. Therefore, a low rating in one category coupled with a higher rating in another category results in a final rating of low, moderate, or high susceptibility. Potential contaminants are divided into four categories: IOCs (i.e., nitrates, arsenic), VOCs (i.e., petroleum products), SOCs (i.e., pesticides), and microbial contaminants (i.e., bacteria). As a spring or a well can be subject to various contamination settings, separate scores are given for each type of contaminant.

For the assessment, a review of laboratory tests was conducted using the State Drinking Water Information System (SDWIS). The last detection of total coliform bacteria in the distribution system was recorded in August 1998. However, no bacteria have been detected at either the wells or springs. No SOCs or VOCs have been detected in the City of Weston water. The IOCs barium, nitrate, selenium, and fluoride have been detected at the sample location for the springs and wells, but were at concentrations below the maximum contaminant level (MCL) for each chemical, as established by the EPA.

Nitrate was detected at the sample location for the springs and wells in November 1997 at 6 milligrams per liter (mg/L), a level greater than half the MCL of 10 mg/L. However, the average nitrate level from 1988 to 2002 is 2.65 mg/L, with the most recent nitrate level (October 2002) being at 1.8 mg/L.

To determine if the City of Weston springs are influenced by surface water, two Microscopic Particulate Analyses (MPAs) are conducted. One MPA was completed in October 2001 during a low water table period. The relative risk rating of this test was zero, indicating that the springs are not influenced by surface water during a low water table period. A second MPA needs to be completed during a period of high water table. If the relative risk rating of the second test also is zero, then the springs are not influenced by surface water.

In terms of total susceptibility, the springs and the wells rated automatically high for IOCs, VOCs, SOCs, and microbial contaminants. Weston Creek flows within 100 feet of both springs, resulting in an automatic high susceptibility to contaminants. The wells are located in a hay field that may be irrigated and sprayed with pesticides or herbicides, contributing to the vulnerability of the wells to contamination and ultimately to the high susceptibility scores. Hydrologic sensitivity and system construction scores for the wells were rated moderate. System construction for the springs was also moderate. Potential contaminant land use scores for all of the drinking water sources rated high for VOCs and SOCs. The potential contaminant land use score for IOCs was high for the wells and springs. The potential contaminant land use score for microbial contaminants was low for Well #1, and moderate for Well #2 and the springs. The high SOC and VOC scores of the wells can be reduced to moderate scores if no chemicals are used on the hay field or the area within 50 feet of the wellheads is fenced. Also, the land where the wells reside is not owned by the City of Weston. The City may want to look into purchasing the land for the wells. Likewise, the high scores of the springs can be reduced to moderate susceptibility if the springs are reconstructed in such a way as to fully protect the sources from the influences of Weston Creek or if the creek is diverted to more than 100 feet from the springs.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the City of Weston, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). The system should assure that no chemicals are used on the field where the wells are located. Additionally, the wells should be protected from access or flooding by installing a fence at least 50 feet from the wellheads to establish the perimeter of the well lot or placing a wellhouse over the wells. The springs should be fenced, establishing a radius of at least 100 feet from the spring sources and they should be properly protected from surface flooding from the creek. As land uses within most of the source water assessment areas are outside the direct jurisdiction of the City of Weston, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success. Educating city employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods and the importance of water conservation. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Franklin County Soil Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CITY OF WESTON, IDAHO

Section 1. Introduction - Basis for Assessment

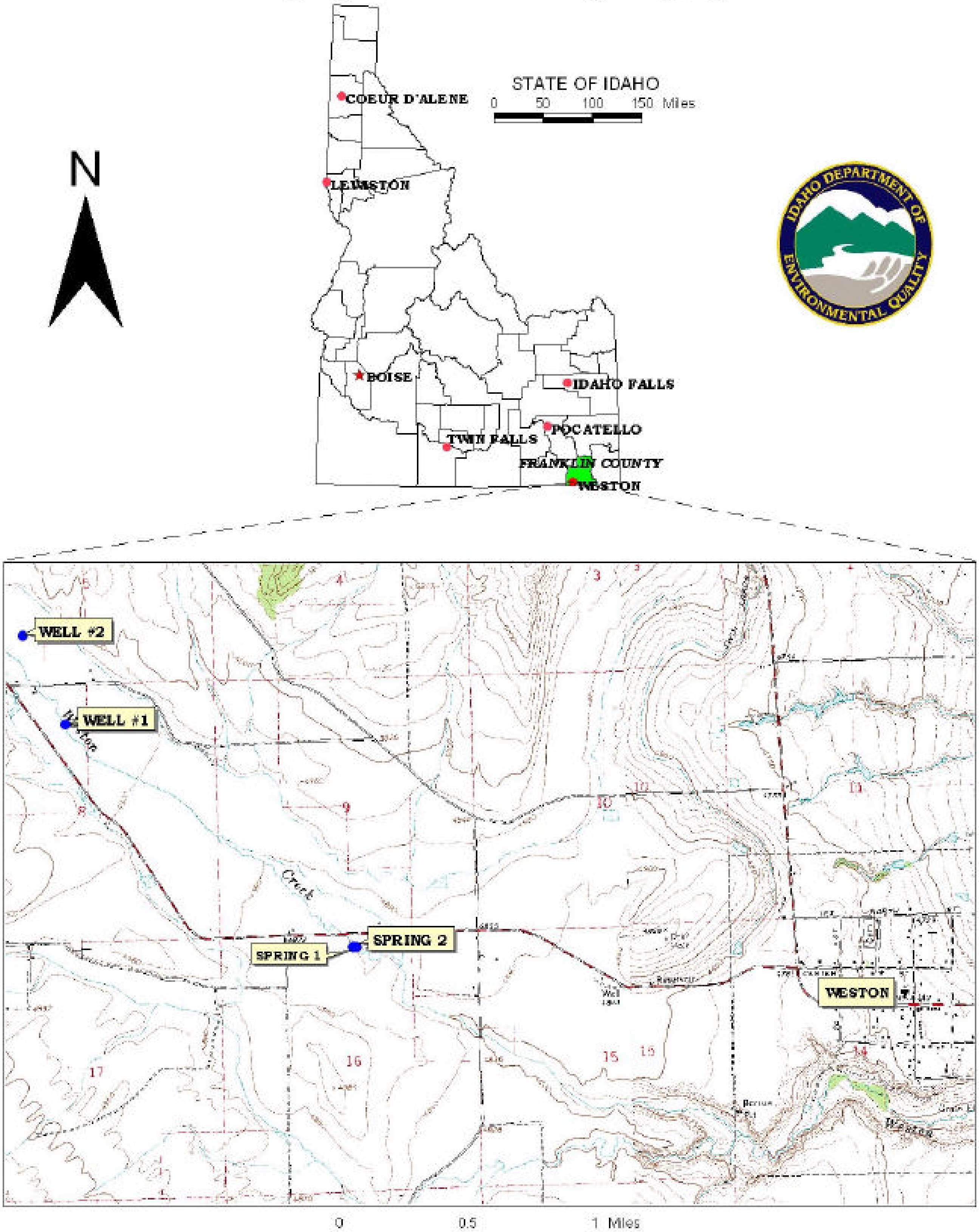
The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, the springs, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water supply system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the public water system (PWS).**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

FIGURE 1. Geographic Location of City of Weston



Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Weston PWS (# 6210019) is a community drinking water system located in Franklin County (Figure 1). The water system includes two wells and two springs. Both wells are located in a field of hay and weeds near Weston Creek in Weston Canyon approximately four miles west of the town of Weston. Well #1 is a backup well, constructed in 1988 and produces approximately 90 gallons per minute (gpm) of water. Well #2 is the main well of the system is located approximately 110 yards west of Well #1. It was also constructed in 1988 and produces 200 gpm of water. The springs for the PWS are approximately 175 feet apart and are located next to Weston Creek. Spring #1 produces 100 gpm and Spring #2 produces 125 gpm. The water from the wells and the springs are stored in two buried, concrete reservoirs located about two miles west of Weston. This water is treated manually by adding 2 gallons (12%) of sodium hypochlorite to the reservoirs once a month. The water system for the City of Weston serves approximately 390 persons through 134 connections.

The last detection of total coliform bacteria in the distribution system was recorded in August 1998. However, no bacteria have been detected at either well or either spring. No synthetic organic chemicals (SOCs) or volatile organic chemicals (VOCs) have been detected in the Weston City water. The inorganic chemicals (IOCs) barium, nitrate, selenium, and fluoride have been detected in the spring and well water but at concentrations below the maximum contaminant level (MCL) for each chemical, as established by the EPA.

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Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a spring or well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a flowing spring) for water in the aquifer. Washington Group International (WGI) was contracted by DEQ to define the PWS's zones of contribution. WGI used a refined method approved by the Source Water Assessment Plan (DEQ, 1999) in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT zones for water associated with the "None" hydrologic province and the "Cache Valley" hydrologic province in the vicinity of the City of Weston. The springs are in the "None" hydrologic province and the wells are in the "Cache Valley" hydrologic province. The computer model used site specific data, assimilated by WGI from a variety of sources including operator records and hydrogeologic reports. A summary of the hydrogeologic information from the WGI is provided below.

"Cache Valley" Hydrogeologic Conceptual Model

The Bear River Basin includes four hydrologic provinces within Idaho: Bear River – Dingle Swamp, Soda Springs, Gem Valley – Gentile Valley, and Cache Valley. The Bear River originates in the Uinta Mountains of northern Utah and winds its way through over 500 miles of Wyoming, Idaho, and Utah to terminate in a freshwater bay of the Great Salt Lake just 90 miles west of its source (Dion, 1969, p. 6). The Bear River enters Idaho near Border, Wyoming and flows along the north edge of the Bear River Plateau. Flowing north through the Bear River – Dingle Swamp hydrologic province, it passes into the Soda Springs hydrologic province east of the Bear River Range. Upon entering the Gem Valley –Gentile Valley hydrologic province, it swings south. Now west of the Bear River Range, the river passes through the Oneida Narrows into the Cache Valley hydrologic province. Over most of its course through Idaho, the Bear River is gaining and in direct hydraulic communication with the major aquifer systems of the four hydrologic provinces. The exception is a small reach between the cities of Alexander and Grace where it is generally losing and is perched over the regional fractured basalt aquifer (Dion, 1969, p. 30).

Ground water in the Bear River Basin is found in Holocene alluvium, Pleistocene basalt, and rocks of the "Pliocene (?)" [sic] Salt Lake Formation, pre-Tertiary undifferentiated bedrock, and possibly the "Eocene (?)" [sic] Wasatch Formation (Dion, 1969, pp. 15 and 16). Rocks of the Salt Lake Formation, which include freshwater limestone, tuffaceous sandstone, rhyolite tuff and poorly-consolidated conglomerate, outcrop along the major valley margins and may underlie the valley-fill alluvium (Dion, 1969, pp. 16 and 17). Many of the wells drilled into this formation do not yield water. The few wells that do produce water yield as much as 1,800 gpm from beds of sandstone and conglomerate.

The Wasatch Formation is restricted to the Bear Lake Plateau and small areas northwest of Bear Lake (Dion, 1969, p. 17 and Figure 6). The formation is composed largely of tightly cemented conglomerate and sandstone with smaller amounts of shale, limestone, and tuff. The primary pore space is typically impermeable. Water movement may occur through joints and fractures or more permeable zones that are thought to exist along the relatively flat-lying formation (Dion, 1969, p. 17). Springs occur at the margins of the formation.

Precipitation in the basin ranges from 10 inches per year (in./yr.) on the floor of Bear Lake Valley to over 45 in./yr. on the Bear River Range (Dion, 1969, pp. Vll and 11). Applied over the entire basin, precipitation amounts to approximately 2.3 million acre-feet annually. Precipitation is also the principal source of recharge to the basin's aquifers in conjunction with spring snowmelt and runoff, irrigation seepage, and canal losses.

Natural ground water discharge is by flow to the Bear River, springs, seeps along riverbanks, and evapotranspiration in large marshy areas (Dion, 1969, p. VIII). Some discharge may also occur by way of underflow to the Portneuf River drainage through basalt flows at Tenmile pass and near Soda Point.

Ground water is obtained from both springs and wells in the Bear River Basin. Hundreds of springs issue primarily from fractures and solution openings in the bedrock on the margins of the basin (Dion, 1969, p. 47). Water production from wells in the four hydrologic provinces is primarily from alluvial and basalt aquifers; however, some wells tap conglomerate, sandstone, limestone and shale aquifers of the Salt Lake and possibly the Wasatch formations (Dion, 1969, p. VII).

Cache Valley is a complex graben covering about 310 square miles in southeastern Idaho and 350 square miles in northeastern Utah. It was once a bay of ancient Lake Bonneville resulting in lake terraces along the margins of the valley (Dion, 1969, p. 7). The related topographic features and deposits of ancient lakes affect the occurrence and movement of ground water (Bjorklund and McGreevy, 1971, p. 14).

The valley floor consists of unconsolidated valley-fill sediments of Quaternary age from the former Lake Bonneville and older lakes and streams, as well as younger alluvium. The sediments consist of silts and gravel of the Alpine and Bonneville formations, overlain by interfingering beds of gravel, sand, silt, and clay. Alluvial fan and landslide deposits are exposed along the margins of the valley. There is a general coarsening of sediments from lower elevations in the center of the valley to the higher elevations at the valley margins (Johnson et al., 1996). The surrounding mountain ranges consist of highly faulted Tertiary Salt Lake and "Wasatch (?)" [sic] formation rocks and Permian through Precambrian rocks (Bjorklund and McGreevy, 1971, Plate 1).

The major aquifers are composed of sand and gravel in fans and deltas; interbedded layers of lake-bottom clays and silts confine the aquifers and cause artesian conditions throughout the valley (Bjorklund and McGreevy, 1971, p.14). Deltas and fans from streams entering the valley generally contain a high percentage of gravel and are considered good aquifers (Bjorklund and McGreevy, 1971, p.15). The exception is the Bear River delta, which is composed mostly of fine sand and silt, contains poor aquifers.

Aquifer recharge occurs mainly by infiltration of water from precipitation, streams, canals, ditches, and irrigated lands and by subsurface inflow. A large volume of recharge originates in the Bear River Range where 30 to 50 inches of precipitation fall in most years. Average annual precipitation on the valley floor is approximately 15.5 inches (Bjorklund and McGreevy, 1971, pp. 5 and 18). The principal recharge area is along the margins of the valley that are underlain by permeable unconsolidated materials (Bjorklund and McGreevy, 1971, p. 18). In the lower parts of the valley, some water is recharged to shallow unconfined aquifers, but infiltrated water does not reach the confined aquifers in Idaho because of the upward artesian gradient.

Ground water is discharged by springs, seeps, drains, evapotranspiration, and wells. Many streams in Cache Valley originate at springs and seeps within the valley, and other streams gain in flow as they traverse the valley floor. Potentiometric levels range in elevation from about 4,850 feet mean sea level (ft msl) near Oxford to about 4,500 feet near the Idaho-Utah border. Generally, the ground water flow direction is locally toward the Bear River and regionally south toward Utah. The Bear River in the Idaho part of Cache Valley is gaining (Bjorklund and McGreevy, 1971, p. 19).

Artesian conditions exist in a large part of the lower valley. Heads of most flowing wells are less than 40 feet above land surface, but heads as high as 62 feet above land surface have been measured (Bjorklund and McGreevy, 1971, p. 22). Water table conditions exist near the edge of the valley beneath alluvial slopes and benchlands. The depth to water is as much as 300 feet below ground surface (bgs) along the margin of the upper valley.

Most wells in the valley produce water from the unconsolidated basin deposits. Driller's logs indicate that the alluvium may contain several aquifers separated by silt and clay (Dion, 1969, p. 19). The most productive aquifer systems in the Idaho part of Cache Valley are in the area of Weston Creek and in fan deposits along the north and west sides of the valley. Aquifer tests near Weston indicate an average transmissivity of about 30,000 square feet per day (ft^2/day) (Bjorklund and McGreevy, 1971, p. 2). Transmissivity values of 5,000 and 40,000 ft^2/day were reported from two tests conducted north of Clifton, Idaho (Johnson et al., 1996, p. 21). For a computer-aided analysis of the resulting test data, the contact at the valley margin was conceptualized as a low- permeability boundary and simulated as a no-flow boundary (Johnson et al., 1996, p .11). All of the Cache Valley PWS wells addressed in this report are located within a couple of miles of the bedrock/valley-fill contact or other near-surface geologic contact.

"None" Hydrogeologic Conceptual Model

Graham and Campbell (1981) identified and described 70 regional ground water systems throughout Idaho. Thirty-four of these fall within the southeastern part of the state. The "None" hydrologic province, as defined in this report, includes all the area outside of the 34 regional systems in southeast Idaho. The smaller and more localized aquifers in the "None" province typically are situated in the foothills and mountains that surround and recharge the regional ground water systems.

The mountains and valleys within the "None" hydrologic province were formed during two events separated by approximately 50 to 70 million years (Alt and Hyndman, 1989, pp. 329 and 336). The overthrust belt of the northern Rocky Mountains was formed roughly 70 to 90 million years ago through the intrusion of granitic magma and a massive eastward movement of large slabs of layered sedimentary rocks along faults that dip shallowly westward (Alt and Hyndman, 1989, p. 329). This movement caused extreme folding and fracturing of the sedimentary and granitic rocks and, in many cases, left older formations lying on top of younger ones. Later Basin and Range block faulting broke up the largely eroded Rocky Mountains into large uplifted and downthrown blocks resulting in the present day northwest trending mountains and valleys seen throughout southeast Idaho. Paleozoic and Precambrian limestone, dolomite, sandstone, shale, siltstone, and quartzite are the predominant materials forming the mountains and probably compose the bedrock underlying the valleys between Salmon, Idaho on the north side of the Snake River Plain and Franklin, Idaho near the Utah/Idaho border (Dion, 1969, p.18; Kariya et al., 1994, p. 6; Bjorklund and McGreevy, 1971, p. 12; and Parliman, 1982, p. 9).

Ground water movement in the mountains is primarily through a system of solution channels, fractures and joints that commonly transmit water independently of surface topography (Bjorklund and McGreevy, 1971, p. 15; Dion, 1969, p. 18). Ralston and others (1979, pp. 128-129) state that the geologic structural features also can contribute to the development of cross-basin ground water flow systems. Ground water entering a geologic formation tends to follow the formation because hydraulic conductivities are greater parallel to the bedding planes than across them. Synclines and anticlines provide structural avenues for ground water flow under ridges from one valley to another.

The average annual precipitation in the mountains of southeast Idaho ranges from 20 inches on ridges near Soda Springs to over 45 inches on the Bear River Range (Ralston and Trihey, 1975, p. 7, and Dion, 1969, p. 11). The valleys receive an average of 7 to 10 inches annually (Donato, 1998, p. 3, and Dion, 1969, p. 11). Precipitation and seepage from streams are the primary source of recharge to the mountain aquifers (Kariya, et al., 1994, p. 18, and Parliman, 1982, p. 13).

Ground water discharge occurs as springs and seeps issuing from faults, fractures, and solution channels and as underflow to regional aquifers. The Bear River Basin in the far southeast corner of the state contains hundreds of springs issuing primarily from fractures and solution openings in the bedrock mountains (Dion, 1969, p. 47, and Bjorklund and McGreevy, 1971, pp. 34-35). Within Cache Valley many springs discharge from the valley-fill deposits (Kariya et al., 1994, p. 32).

There is little available information on the distribution of hydraulic head and the hydraulic properties of the aquifers in the "None" hydrologic province. No U.S. Geological Survey (2001) or Idaho Statewide Monitoring Network (Neely, 2001) wells are located in the areas of concern to provide information on ground water flow direction and hydraulic gradient or to aid in model calibration. The information that is available indicates that the hydraulic properties are quite variable, even within a specific rock type. Ralston and others (1979, p. 31), for example, present hydraulic conductivity estimates for fractured chert ranging from 2.2 to 75 feet per day (ft/day). Estimates for phosphatic shale are as low as 0.07 ft/day (unfractured) and as high as 25 ft/day (fractured).

Springs and Spring Delineation Methods

A spring is defined as a concentrated discharge of ground water appearing at the ground surface as flowing water (Todd, 1980). The discharge of a spring depends on the hydraulic conductivity of the aquifer, the area of contributing recharge to the aquifer, and the rate of aquifer recharge. PWS springs are generally perennial. Large seasonal changes in the discharge rates are an indication of a relatively shallow flow system. While most springs fluctuate in their rate of discharge, springs in volcanic rock (e.g., basalt) are noted for their nearly constant discharge (Todd, 1980).

Delineation of the drinking water protection area for a spring involves special consideration. Hydrogeologic setting is foremost among the factors that control the shape and extent of the capture zone. A spring resulting from the presence of a high permeability fracture extending to great depth will have a much different capture zone than a depression spring formed where the ground surface intersects the water table in a unconsolidated aquifer.

Refined Delineation Method

Capture zones for the City of Weston wells were delineated using the Cache 1 WhAEM ground water flow model. The method is based on well completion data, proximity of the well to the bedrock/valley-fill contact and/or faults, and knowledge of ground water flow direction based on water table contour maps ((Bjorklund and McGreevy, 1971, Plates 1 and 4, and Kariya et al., 1994, Plate 2). The Cache 1 model includes two wells located along Weston Creek where the flow direction and gradient are known, a number of test points wells are located, and aquifer homogeneity is a reasonably valid assumption.

To maintain conservatism in the delineation of capture zones for Weston, the pumping rate for Well #2 is half the average PWS water usage of 289,400 gallons per day (gal/day) because the springs are considered the primary PWS water source and are assumed to produce at least 50 percent of the water supply. Well #1 was treated as a backup well and pumped at the same rate as Well #2 in a separate simulation. The geometric mean of hydraulic conductivity estimates presented by Bjorklund and McGreevy (112 ft/day; 1971, Table 5) was used to simulate base case conditions. The effective porosity is 0.3, which is the default value presented in Table F-3 of the Idaho Wellhead Protection Plan for unconsolidated alluvium (IDEQ, 1997, p. F-6). Aquifer base elevation was set at 4,467 ft msl (approximately 31 feet below the Bear River stage near the Idaho-Utah Border). The aquifer thickness is the average perforated interval for the Weston wells (31 feet).

Areal recharge to the aquifer was set to zero, because precipitation does not recharge the confined aquifers due to the upward hydraulic gradient. Constant-head boundary conditions were used upgradient and downgradient of the PWS wells to establish the observed hydraulic gradient and flow direction. A constant-flux line sink backed by a no-flow boundary was used to simulate recharge along the valley margins. The placement of constant-head line sinks and assignment of head values was based on a published potentiometric surface map (Bjorklund and McGreevy, 1971, Plate 4) and adjusted during model calibration to obtain the best fit using the least squares method (Macneal, 1992, p. 175, and Rafai et al., 1998, p. 98.).

Previously constructed WhAEM ground water flow models were used to evaluate PWS springs producing water for the City of Weston. This approach assumes that the springs produce from the same aquifers that were simulated with Cache 1 model. Source areas for the Weston springs were delineated using the Cache 1 model, (WGI, 2002b). The springs were placed in the model at the appropriate locations and simulated as constant-rate pumping wells. Because of the location of the City of Weston springs adjacent to one of the original Cache 1 model boundaries, it was necessary to relocate the boundary and add two additional constant-head boundaries to maintain the proper hydraulic gradients. The model input remained consistent with the original model and calibration was performed by adjusting the head along the constant-head boundaries.

The delineated source water assessment areas for the City of Weston wells and springs can be described as northwest-trending corridors following Weston Creek and the Weston Canyon Road. The average total area is 5,053 acres for the City of Weston wells; the total area of the Weston spring #1 is 1,445 acres and the total area of the Weston spring #2 is approximately 1,990 acres (Figure 2, 3, 4, 5 in Appendix A). The actual data used by WGI in determining the source water assessment delineation areas is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of available databases identified potential contaminant sources within the delineated areas.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply source.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in 2002. The first phase involved identifying and documenting potential contaminant sources within the City of Weston source water assessment area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential contaminant sources in the delineated areas. The enhanced inventory was completed with the assistance of Mr. Rick Nielsen. The potential contaminants within the delineation areas of the springs and wells include a dairy, Weston Creek, Weston Canyon Road (Highway 36), and a dirt road. The potential contaminants for each source are listed in the Tables 2, 3, 4, and 5 in Appendix A. The 2001 sanitary survey indicates that the wells are located in a field of hay and weeds and livestock are near. Though these sources are not included in the tables in Appendix A, they were used to assess the susceptibility of the wells. Maps with the spring and well locations, delineated areas, and potential contaminant sources are provided with this report (Figure 2, Figure 3, Figure 4, and Figure 5 in Appendix A).

Section 3. Susceptibility Analyses

The springs' susceptibility to contamination were ranked as high, moderate, or low risk according to the following considerations: construction, land use characteristics, and potentially significant contaminant sources. Similarly, the wells' susceptibility to contamination were ranked as high, moderate, or low risk according to the following considerations: hydrologic sensitivity, system construction, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for the springs or the wells is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix B contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors. These factors are surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay have better filtration capabilities and therefore are typically more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity was rated moderate for both wells (Table 1). This is based upon moderate to well drained soil classes as defined by the National Resource Conservation Service (NRCS). Well logs for both wells were unavailable, limiting the information concerning the composition of the vadose zone and the location of the producing zone of the wells. However, the 2001 sanitary survey indicates both wells penetrate about 130 feet of clay, suggesting the existence of an aquitard, a zone that may reduce the downward movement of contaminants to the aquifer.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

Both wells were drilled in 1988 in a hay field near Weston Creek in Weston Canyon. Both wells penetrate about 130 feet of clay and then about 30 feet of sand and gravel. Well #1 produces approximately 90 gpm and Well #2 produces about 200 gpm. The well logs were unavailable.

The system construction scores were rated as moderately susceptible for both wells (Table 1). Both wellheads are located outside of the 100-year floodplain and the 2001 sanitary survey (conducted by DEQ) indicates that the wellhead and surface seals are maintained and in good condition. The scores were increased because the well logs were unavailable, limiting the information concerning the construction of the wells and whether the wells met current construction standards.

The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all PWSs to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead and if the well is designed to yield greater than 50 gpm a minimum of a 6-hour pump test is required. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within consolidated material or 18 feet below the surface, the thickness of the casing, etc. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. In this case, there was insufficient information available to determine if the wells meet all the criteria outlined in the IDWR Well Construction Standards.

Spring Construction

Spring construction scores are determined by evaluating whether the spring has been constructed according to Idaho Code (IDAPA 58.01.08.04) and if the spring's water is exposed to any potential contaminants from the time it exits the bedrock to when it enters the distribution system. If the spring's intake structure, infiltration gallery, and housing are located and constructed in such a manner as to be permanent and protect it from all potential contaminants, is contained within a fenced area of at least 100 feet in radius, and is protected from all surface water by diversions, berms, etc., then Idaho Code is being met and the score will be lower. If the spring's water comes in contact with the open atmosphere before it enters the distribution system, it receives a higher score. Likewise, if the spring's water is piped directly from the bedrock to the distribution system or is collected in a protected spring box without any contact to potential surface-related contaminants, the score is lower.

The springs are approximately 175 feet apart and are located next to Weston Creek. Water is collected by perforated collection pipes and discharged directly into the transmission line. A diversion ditch runs along the western side of the adjacent field to collect and carry off any surface runoff water. According to the 2001 sanitary survey (conducted by DEQ), roots could be seen growing into one of the collection boxes.

Both City of Weston springs rated moderately susceptible for system construction (Table 1). The intake structure (the perforated collection pipe) is properly constructed. However, according to a 1994 sanitary survey checklist, the spring areas are not fenced and roots were seen growing into one of the collection boxes, exposing the collected water to potential contaminants. Therefore, although the water is never exposed to the atmosphere, the springs are not constructed in such a way as to minimize the impacts of contamination.

Potential Contaminant Source and Land Use

The potential contaminant source and land use of the wells rated high susceptibility for IOCs (i.e., nitrates, arsenic), and moderate susceptibility for VOCs (i.e., petroleum products), SOCs (i.e., pesticides), and microbial contaminants (i.e., bacteria). The springs rated moderate susceptibility for IOCs, VOCs, and SOCs and low susceptibility to microbial contaminants. The predominant agricultural land use of the area, the dairy near the wells, and the transportation and water corridors that run through the delineations contributed to the potential contaminant/land use scores.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a confirmed microbial detection at the wellhead will automatically give a high susceptibility rating to the springs or the wells, despite the land use of the area, because a pathway for contamination already exists. Additionally, potential contaminant sources within 100 feet of a spring and within 50 feet of a wellhead will automatically lead to a high susceptibility rating. In this case, Weston Creek is within 100 feet of both springs and the wells are located in a hay field that may be sprayed with pesticides or herbicides, resulting in automatically high susceptibility for all of the City of Weston drinking water sources. Having multiple potential contaminant sources in the 0- to 3-year TOT zone (Zone 1B) contribute greatly to the overall ranking.

Table 1. Summary of City of Weston Susceptibility Evaluation

Drinking Water Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Potential Contaminant Inventory and Land Use				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	H	H	H	L	M	H(*)	H*	H*	H*
Well #2	M	H	H	H	M	M	H(*)	H*	H*	H(*)
Spring #1	--	H	H	H	M	M	H*	H*	H*	H*
Spring #2	--	H	H	H	M	M	H*	H*	H*	H*

[1]**H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,**
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = Automatic high score due to the location of the wells in a hay field and Weston Creek within 100 feet of the springs
H(*) = High number of points and location of the wells in a hay field

Susceptibility Summary

In terms of total susceptibility, the springs and the wells rated automatically high for IOCs, VOCs, SOCs, and microbial contaminants. Weston Creek flows within 100 feet of both springs, resulting in an automatic high susceptibility to contaminants. The wells are located in a hay field that may be irrigated and sprayed with pesticides or herbicides, contributing to the vulnerability of the wells to contamination and ultimately to the high susceptibility scores. Hydrologic sensitivity and system construction scores for the wells were rated moderate. System construction for the springs was also moderate. Potential contaminant land use scores for all of the drinking water sources rated moderate for VOCs and SOCs. The potential contaminant land use score for IOCs was high for the wells and springs. The potential contaminant land use score for microbial contaminants was low for Well #1, and moderate for Well #2 and the springs. The high SOC and VOC scores of the wells can be reduced to moderate scores if no chemicals are used on the hay field and the well's are properly fenced. Also, the land the wells reside is not owned by the City of Weston. The City may want to look into purchasing the land for the wells. Likewise, the high scores of the springs can be reduced to moderate susceptibility if the springs are reconstructed in such a way as to fully protect the sources from the influences of Weston Creek or if the creek is diverted from the springs.

The last detection of total coliform bacteria in the distribution system was recorded in August 1998. However, no bacteria have been detected at either wells or springs. No SOCs or VOCs have been detected in the Weston City water. The IOCs barium, nitrate, selenium, and fluoride have been detected at the sample location for the springs and wells, but at concentrations below the MCL for each chemical, as established by the EPA.

Nitrate was detected at the sample location for the springs and wells in November 1997 at 6 mg/L, a level greater than half the MCL of 10 mg/L. However, the average nitrate level from 1988 to 2002 is 2.65 mg/L, with the most recent nitrate level (October 2002) being at 1.8 mg/L.

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the City of Weston, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. The system should assure that no chemicals are used on the field where the wells are located. Additionally, the wells should be protected from access or flooding by installing a fence at least 50 feet from the wellheads to establish the perimeter of the well lot or placing a wellhouse over the wells. The springs should be fenced, establishing a radius of at least 100 feet from the spring sources and they should be properly protected from surface flooding from the creek. As land uses within most of the source water assessment areas are outside the direct jurisdiction of the City of Weston, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success. Educating city employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include household hazardous waste disposal methods and the importance of water conservation. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Franklin County Soil Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g., zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office (208) 236-6160

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper (mlharper@idahoruralwater.com), Idaho Rural Water Association, at (208) 343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLA – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRA – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

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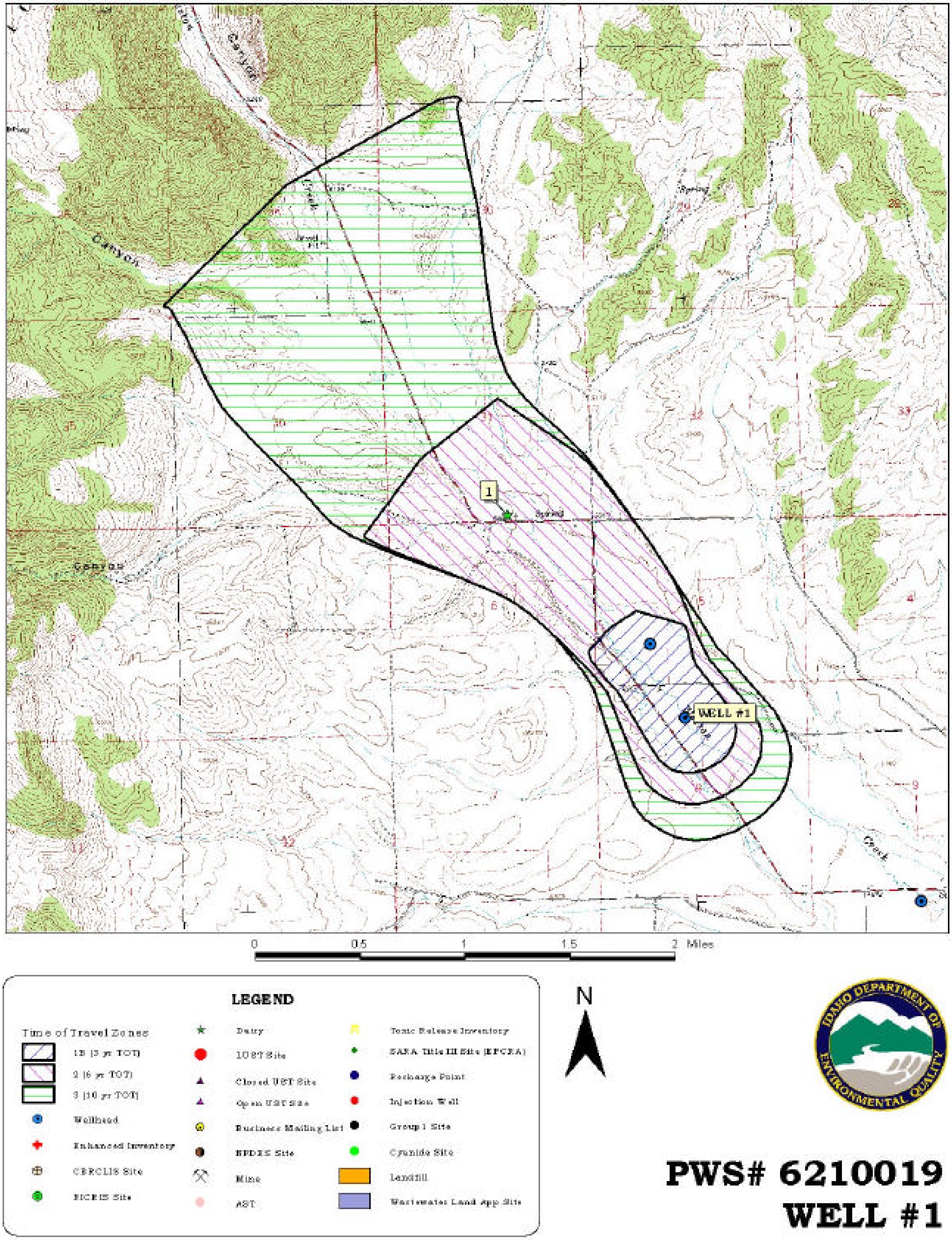
Appendix A

City of Weston
Potential Contaminant Inventory

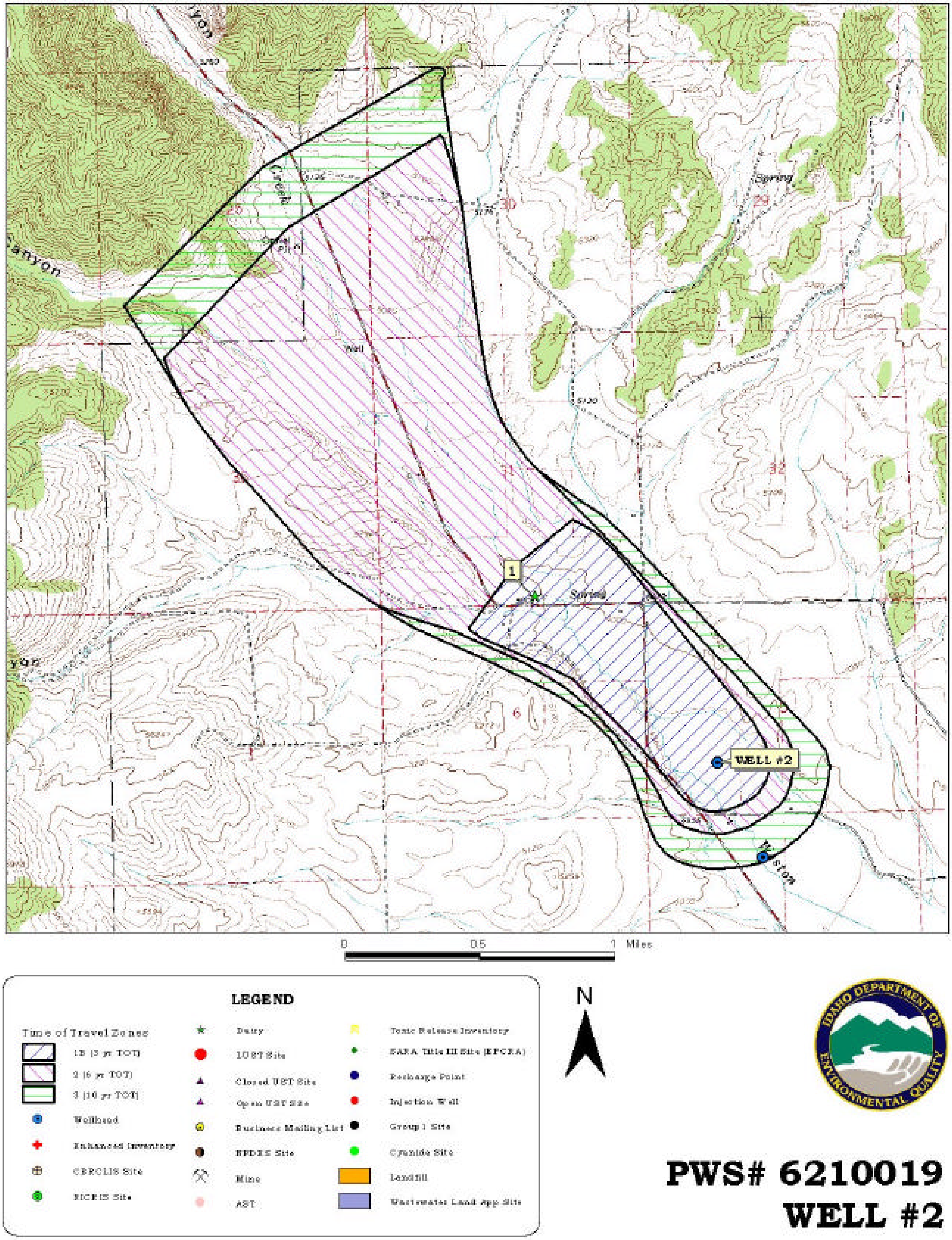
Figures 2, 3, 4, and 5
Tables 2, 3, 4, and 5

FIGURE 2. City of Weston Delineation Map and Potential Contaminant Source Locations



PWS# 6210019
WELL #1

FIGURE 3. City of Weston Delineation Map and Potential Contaminant Source Locations



PWS# 6210019
WELL #2

FIGURE 4. City of Weston Delineation Map and Potential Contaminant Source Locations

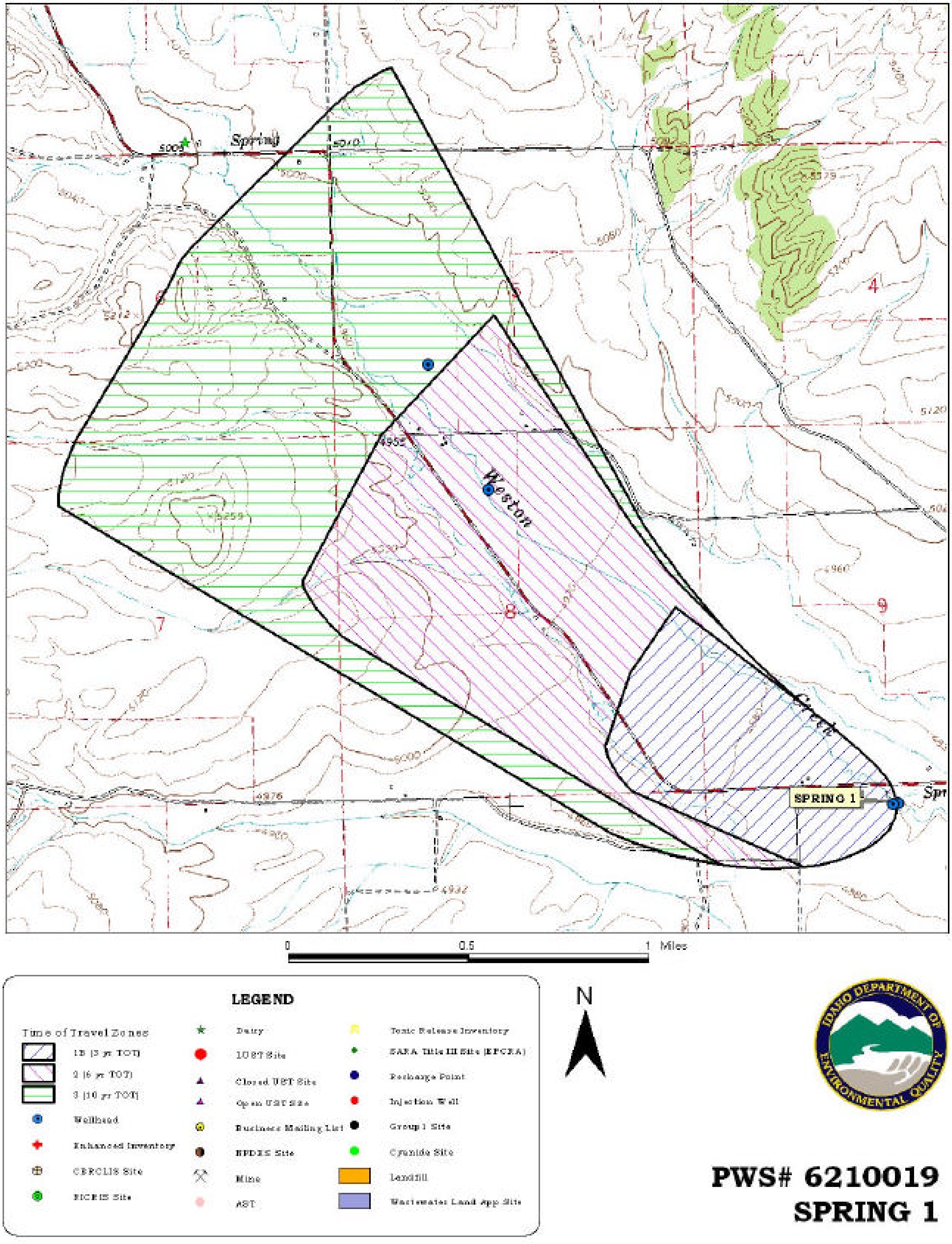
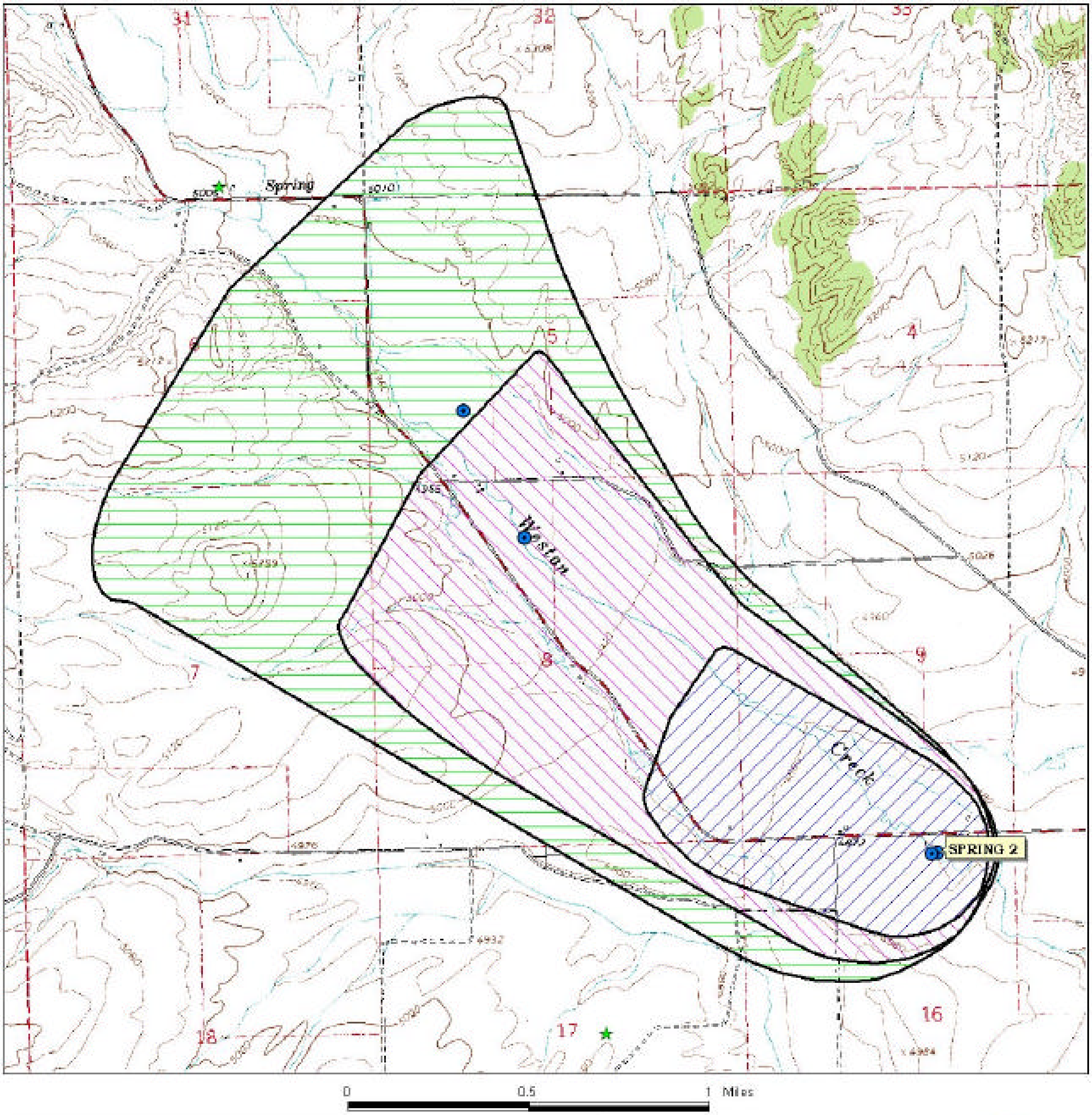


FIGURE 5. City of Weston Delineation Map and Potential Contaminant Source Locations



LEGEND

Time of Travel Zones
- 1B (3 yr TOT)
- 2 (6 yr TOT)
- 3 (10 yr TOT)
- Wellhead
- Enhanced Inventory
- CERCLIS Site
- RICRIS Site
- Dairy
- LUST Site
- Closed UST Site
- Open UST Site
- Business Mailing List
- NPDES Site
- Mine
- AST
- Toxic Release Inventory
- SARA Title III Site (EPCRA)
- Recharge Point
- Injection Well
- Group 1 Site
- Cyanide Site
- Landfill
- Wastewater Land App Site

N

PWS# 6210019
SPRING 2

Table 2. City of Weston, Well #1, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
1	Dairy <=200 Cows	3-6	Database Inventory	IOC, Microbials
	Weston Creek	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Creek	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Weston Canyon Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Canyon Road	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Unimproved Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Unimproved Road	3-6	GIS Map	IOC, VOC, SOC

[1] **TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

[2] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

Table 3. City of Weston, Well #2, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
1	Dairy <=200 Cows	0-3	Database Inventory	IOC, Microbials
	Weston Creek	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Creek	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Weston Canyon Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Canyon Road	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Unimproved Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Unimproved Road	3-6	GIS Map	IOC, VOC, SOC

[1] **TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

[2] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

Table 4. City of Weston, Spring #1, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
	Weston Creek	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Creek	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Weston Canyon Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Canyon Road	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Unimproved Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Unimproved Road	3-6	GIS Map	IOC, VOC, SOC

[1] **TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

[2] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

Table 5. City of Weston, Spring #2, Potential Contaminant Inventory

Site #	Source Description	TOT Zone[1] (years)	Source of Information	Potential Contaminants[2]
	Weston Creek	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Creek	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Weston Canyon Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Weston Canyon Road	3-6, 6-10	GIS Map	IOC, VOC, SOC
	Unimproved Road	0-3	GIS Map	IOC, VOC, SOC, Microbials
	Unimproved Road	3-6	GIS Map	IOC, VOC, SOC

[1]**TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**

[2] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

Appendix B

City of Weston

Susceptibility Analysis Worksheets

Susceptibility Analysis Formulas

Formula for Spring Sources
The final spring scores for the susceptibility analysis were determined using the following formulas:

1. VOC/SOC/IOC/ Final Score = (Potential Contaminant/Land Use X 0.60) + System Construction

2. Microbial Final Score = (Potential Contaminant/Land Use X 1.125) + System Construction

Final Susceptibility Scoring:
0 - 7 Low Susceptibility
8 - 15 Moderate Susceptibility
≥ 16 High Susceptibility

Formula for Well Sources
The final scores for the susceptibility analysis were determined using the following formulas:

1. VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2. Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:
0 - 5 Low Susceptibility
6 - 12 Moderate Susceptibility
≥ 13 High Susceptibility

Ground Water Susceptibility Report   Public Water System Name : WESTON CITY OF   Source : WELL #1
Public Water System Number: 6210019   11/21/02 11:37:54 AM

1. System Construction

		SCORE
Drill Date	1988	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
	Total System Construction Score	4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
	Total Hydrologic Score	4

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	3	3	3	3
(Score = # Sources X 2) 8 Points Maximum		6	6	6	6
Sources of Class II or III leacheable contaminants or	YES	7	3	3	
4 Points Maximum		4	3	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	13	13	10

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES (86% undetermined Ag.	2	2	2	
Total Potential Contaminant Source / Land Use Score - Zone III		4	4	4	0

Cumulative Potential Contaminant / Land Use Score	23	21	21	10
4. Final Susceptibility Source Score	13	12	12	12
5. Final Well Ranking	High	High	High	High

1. System Construction

		SCORE
Drill Date	1988	
Driller Log Available	NO	
Sanitary Survey (if yes, indicate date of last survey)	YES	2001
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0
Total System Construction Score		4

2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1

Potential Contaminant / Land Use - ZONE 1B

		IOC	VOC	SOC	Microbial
Contaminant sources present (Number of Sources)	YES	4	3	3	4
(Score = # Sources X 2) 8 Points Maximum		8	6	6	8
Sources of Class II or III leacheable contaminants or	YES	8	3	3	
4 Points Maximum		4	3	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	13	13	12

Potential Contaminant / Land Use - ZONE II

		IOC	VOC	SOC	Microbial
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0

Potential Contaminant / Land Use - ZONE III

		IOC	VOC	SOC	Microbial
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	YES (91% undeter. Ag.)	2	2		
Total Potential Contaminant Source / Land Use Score - Zone III		4	4	4	0

Cumulative Potential Contaminant / Land Use Score	26	21	21	13
4. Final Susceptibility Source Score	13	12	12	13
5. Final Well Ranking	High	High	High	High

Spring Water Susceptibility Report   Public Water System Name : WESTON CITY OF   Source: SPRING 1
Public Water System Number: 6210019   11/18/02 4:09:25 PM

1. System Construction		SCORE			
Intake structure properly constructed	NO	1			
Is the water first collected from an underground source? Yes=spring developed to collect water from beneath the ground; lower score No=water collected after it contacts the atmosphere or unknown; higher score	YES	0			
Total System Construction Score		1			

2. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	3	3	3	3
(Score = # Sources X 2) 8 Points Maximum		6	6	6	6
Sources of Class II or III leacheable contaminants or	YES	7	2	2	
4 Points Maximum		4	2	2	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	12	12	10
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		22	20	20	11
3. Final Susceptibility Source Score		11	10	10	9
4. Final Well Ranking		High	High	High	High

Spring Water Susceptibility Report   Public Water System Name: WESTON CITY OF   Source: SPRING 2
Public Water System Number: 6210019   11/18/02 4:09:48 PM

1. System Construction

		SCORE
Intake structure properly constructred	NO	1
Is the water first collected from an underground source? Yes=spring developed to collect water from beneath the ground; lower score No=water collected after it contacts the atmosphere or unknown; higher score	YES	0
Total System Construction Score		1

2. Potential Contaminant / Land Use - ZONE 1A

		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED PASTURE	1	1	1	1
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	YES	YES
Total Potential Contaminant Source/Land Use Score - Zone 1A		1	1	1	1

Potential Contaminant / Land Use - ZONE 1B

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant sources present (Number of Sources)	YES	3	3	3	3
(Score = # Sources X 2) 8 Points Maximum		6	6	6	4
Sources of Class II or III leacheable contaminants or	YES	7	3	3	
4 Points Maximum		4	3	3	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Greater Than 50% Irrigated Agricultural	4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		14	13	13	10

Potential Contaminant / Land Use - ZONE II

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II	Greater Than 50% Irrigated Agricultural	2	2	2	
Potential Contaminant Source / Land Use Score - Zone II		5	5	5	0

Potential Contaminant / Land Use - ZONE III

		IOC Score	VOC Score	SOC Score	Microbial Score
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		22	20	20	11

3. Final Susceptibility Source Score

	IOC	VOC	SOC	Microbial
3. Final Susceptibility Source Score	11	10	10	9
4. Final Well Ranking	High	High	High	High